

Exemplars

Title: Sawing a Board

Achievement Level: Novice 1

Criteria and Performance Level	Rationales
Problem Solving <i>Novice</i>	The student's strategy of using a number line to indicate 20 equal parts of a board with 10 parts shaded in would not work to solve the task. The student's answer, "Gavin is correct," is not correct as it is based on an incorrect diagram.
Reasoning & Proof <i>Novice</i>	The student does not demonstrate correct reasoning of the underlying concepts of adding/subtracting fractions or that the denominator refers to the total number of equal parts referring to the same whole. The student does not show correct reasoning that $\frac{8}{10}$ would be eight out of 10 equal portions of the board sawed off. It appears the student made 10 parts of a board by adding all the numerators listed in the task and then added another 10 parts to the board.
Communication <i>Novice</i>	The student does not use any mathematical language to communicate their solution.
Connections <i>Novice</i>	The student does not make a mathematical observation about their solution. The statement, "He uses lots of the board," is not supported by the diagram that shows $\frac{1}{2}$ of the pieces remaining.
Representation <i>Apprentice</i>	The student's use of a diagram is appropriate to the task but not accurate. The diagram should indicate ten equal parts of the board with eight parts shaded in. The student's text defines the board and "pieces."

Exemplars

Achievement Level: Novice 1

P/S	R/P	Com	Con	Rep	A/Level
N	N	N	N	A	N

I need to see if Gavin is correct.
I will make the board



Gavin uses 10 pieces.
Gavin has 10 left.

Gavin is correct.

He uses lots of the board.

Exemplars

Title: Sawing a Board

Achievement Level: Novice 2

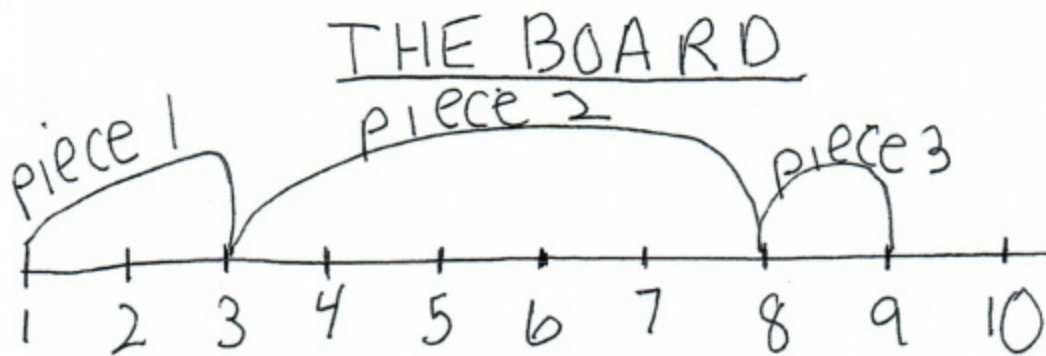
Criteria and Performance Level	Rationales
Problem Solving <i>Apprentice</i>	The student's strategy of using a number line to indicate the portion of board sawed off would work to solve the task, but it appears the student begins the number line at one foot instead of zero. The student's answer, "Gavin is wrong. There is only one piece left over," is not correct.
Reasoning & Proof <i>Apprentice</i>	The student shows some correct reasoning of the underlying concept of adding/subtracting fractions referring to the same whole. The student does not show correct reasoning that the number line has to start with zero to represent that Gavin first saws off $\frac{2}{10}$ of the board.
Communication <i>Novice</i>	The student does not use any mathematical language to communicate their solution.
Connections <i>Novice</i>	The student does not make a mathematical observation about their solution.
Representation <i>Apprentice</i>	The student's use of a number line is appropriate to the task but not accurate. The number line should start at zero and it appears the student starts at one "foot." The student does not label the numbers on their number line to represent feet.

Exemplars

Achievement Level: Novice 2

P/S	R/P	Com	Con	Rep	A/Level
A	A	N	N	A	N

I have to find if Gavin is correct. I will draw the board.



Gavin is wrong. There is only one piece leftover.

Exemplars

Title: Sawing a Board

Achievement Level: Apprentice 1

Criteria and Performance Level	Rationales
Problem Solving <i>Practitioner</i>	The student's strategy of using a table to show the parts of the board sawed off for each cut and a total of $\frac{8}{10}$ cut off works to solve the task. The student's answer, "Gavin is correct," is correct.
Reasoning & Proof <i>Practitioner</i>	The student demonstrates correct reasoning of the underlying concepts of adding/subtracting fractions referring to the same whole. The table and text support a systematic approach to the task.
Communication <i>Practitioner</i>	The student correctly uses the mathematical notation $\frac{2}{10}$, $\frac{5}{10}$, $\frac{1}{10}$ from the task. The student also correctly uses the mathematical notation $\frac{7}{10}$, $\frac{8}{10}$, $\frac{10}{10}$.
Connections <i>Novice</i>	The student does not make a mathematical observation about their solution. The student's text is used to support the data on their table and their answer and is the necessary reasoning to arrive at a correct answer.
Representation <i>Apprentice</i>	The student's table is appropriate to the task but not accurate. The third column should state, "total board cut," The student's label is the same for both columns.

Exemplars

Achievement Level: Apprentice 1

P/S	R/P	Com	Con	Rep	A/Level
P	P	P	N	A	A

I need to see if Gavin is correct.
I will make a table.

board pieces

cut	board cut	board cut
1	$\frac{2}{10}$	$\frac{2}{10}$
2	$\frac{5}{10}$	$\frac{7}{10}$
3	$\frac{1}{10}$	$\frac{8}{10}$

Answer

Gavin is correct

It is $\frac{2}{10}$ because $\frac{10}{10} - \frac{8}{10} = \frac{2}{10}$ and $\frac{2}{10} + \frac{8}{10} = \frac{10}{10} = 1$ whole board.

Exemplars

Title: Sawing a Board

Achievement Level: Practitioner 1

Criteria and Performance Level	Rationales
Problem Solving <i>Practitioner</i>	The student's strategy of using a diagram to show the parts of the board sawed off for each cut and a total of $\frac{8}{10}$ cut off works to solve the task. The student's answer, "Gavin is correct," is correct.
Reasoning & Proof <i>Practitioner</i>	The student demonstrates correct reasoning of the underlying concepts of adding/subtracting fractions referring to the same whole. The diagram, key and text support a systematic approach to the task.
Communication <i>Practitioner</i>	The student correctly uses the mathematical term <i>feet</i> and the mathematical notation $\frac{2}{10}$, $\frac{5}{10}$, $\frac{1}{10}$ from the task. The student also correctly uses the mathematical terms <i>diagram</i> , <i>key</i> , <i>dozen</i> , <i>inches</i> .
Connections <i>Practitioner</i>	The student makes the mathematical observations, "That is 2 dozen inches," "That is 24 inches," "The longest piece is $\frac{5}{10}$," and "That is 60 inches."
Representation <i>Practitioner</i>	The student's diagram is appropriate to the task and accurate. A key is provided to indicated which one foot portions of the board are sawed each time.

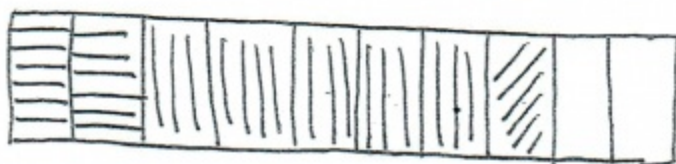
Exemplars

Achievement Level: Practitioner 1

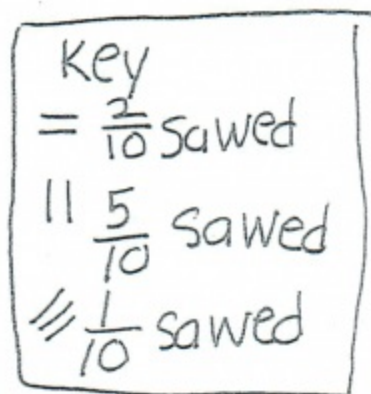
P/S	R/P	Com	Con	Rep	A/Level
P	P	P	P	P	P

I need to see if Gavin is correct,
I will make a diagram.

10 feet of board



(Gavin is correct) $\frac{2}{10}$ is left



he did not use 2 feet, that is 2 dozen
inches, that is 24 inches.

The longest piece is $\frac{5}{10}$
That is 60 inches.

$$\begin{array}{r} 12 \times 5 = \underline{\quad} \\ 10 \times 5 = 50 \\ 2 \times 5 = 10 \\ \hline 60 \end{array}$$

Exemplars

Title: Sawing a Board

Achievement Level: Practitioner 2

Criteria and Performance Level	Rationales
Problem Solving <i>Practitioner</i>	The student's strategy of using diagrams to show the parts of the board sawed off for each fractional cut and then a board showing the total amount of the board that is cut works to solve the task. The student's answer, "Yes Gavin was right," is correct.
Reasoning & Proof <i>Practitioner</i>	The student demonstrates correct reasoning of the underlying concepts of adding/subtracting fractions referring to the same whole. The diagrams and text support a systematic approach to the task.
Communication <i>Practitioner</i>	The student correctly uses the mathematical term <i>feet</i> and the mathematical notation $2/10$, $5/10$, $1/10$, from the task. The student also correctly uses the mathematical terms <i>diagram</i> , <i>more</i> . The student correctly uses the mathematical notation $<$, $>$.
Connections <i>Practitioner</i>	The student makes the mathematical observations, "5/10 is longest piece sawed off." The student uses the greater than and less than signs to compare the board lengths sawed off, " $2/10 < 5/10$, $2/10 > 1/10$, $5/10 > 2/10$, $5/10 > 1/10$, $1/10 < 5/10$."
Representation <i>Practitioner</i>	The student's diagrams are appropriate to the task and accurate. All necessary labels are provided to indicate which one foot portions of the board are sawed each time. The student provides a diagram to show the total amount of the board that was sawed off and the $2/10$ of remaining board. The student's text support their diagrams.

Exemplars

Achievement Level: Practitioner 2

P/S	R/P	Com	Con	Rep	A/Level
P	P	P	P	P	P

I going to see if Gavin is right.
I will make a diagram how much each piece cut looks like.

The Board
What cut pieces look like

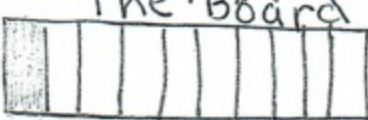
he cuts off $2/10$



Now he cut $5/10$ more



Last he cuts $1/10$



$5/10$ is longest piece sawed off

$$\begin{aligned} 2/10 &< 5/10 \\ 2/10 &> 1/10 \\ 5/10 &> 2/10 \\ 5/10 &> 1/10 \\ 1/10 &< 2/10 \\ 1/10 &< 5/10 \end{aligned}$$

Final results Board



there are only 2 feet left so the left over board is $2/10$ yes Gavin was right

Look at the pieces cut. what could he build with them?

Exemplars

Title: Sawing a Board

Achievement Level: Expert 1

Criteria and Performance Level	Rationales
Problem Solving <i>Expert</i>	The student's strategy of using an area model to show the parts of the board sawed off for each fractional cut works to solve the task. The student's answer, "Gavin is correct," is correct. The student uses alternative strategies to support their correct answer.
Reasoning & Proof <i>Expert</i>	The student demonstrates correct reasoning of the underlying concepts of adding/subtracting fractions referring to the same whole. The student extends their thinking to include the concepts of decimals and percents. The student uses alternative strategies to justify that their answer is correct.
Communication <i>Expert</i>	The student correctly uses the mathematical term <i>feet</i> and the mathematical notation $2/10$, $5/10$, $1/10$ from the task. The student also correctly uses the mathematical terms <i>area model</i> , <i>number line</i> , <i>1st</i> , <i>2nd</i> , <i>3rd</i> , <i>table</i> , <i>more</i> , <i>dozen</i> , <i>key</i> , <i>inches</i> , <i>equivalent fractions</i> , <i>fractions</i> , <i>whole</i> , <i>decimal</i> . The student correctly uses the mathematical notation $0/10$, $3/10$, $4/10$, $6/10$, $7/10$, $9/10$, $10/10$, $1/5$, $2/5$, $3/5$, $4/5$, 50% , 100% , $'$, $,$, 0.1 , 0.2 , 0.3 , 0.4 , 0.5 , 0.6 , 0.7 , 0.8 , 0.9 .

Exemplars

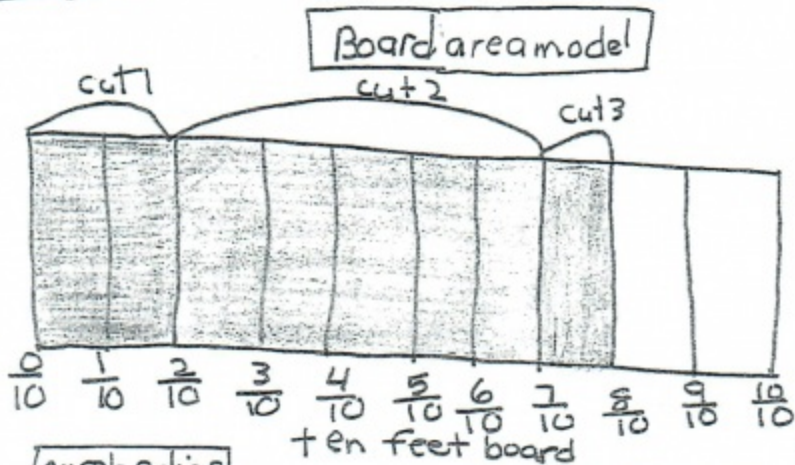
<p>Connections <i>Expert</i></p>	<p>The student makes the Practitioner mathematical observations, "Gavin uses more board than he keeps," $12" \times 10' = 120"$, $12" + 12" = 24$," "that is 2 dozen inches-24," and, "1/2 of Gavin's board is 5'." The student makes the Expert connection by justifying their answer. The student uses evidence from their number line and table to support the statement, "I solved my problem 3 way. I get 2/10 left all the time so Gavin is correct." The student considers other mathematical concepts. The student finds the equivalent fractions for 2/10, 4/10, 6/10, 8/10, and 10/10 and includes them on their number line. The student also reasons that, "5/10 is 1/2 or 50% of the board," "10/10 of the board is 100% of the board," and, "That is percent like at the store when a toy is 50% off. The student also considers decimals by including the decimal notation for the fractions 1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10.</p>
<p>Representation <i>Expert</i></p>	<p>The student's diagram is appropriate to the task and accurate. All necessary labels are provided to indicate which one foot portions of the board are sawed each time. The student provides a number line to show the total amount of the board that was sawed off and the 2/10 remaining board. All necessary labels are provided. The student's table is appropriate and accurate. The labels for each column are correct and the entered data is correct. The student uses these two additional representations to justify that their answer is correct.</p>

Exemplars

Achievement Level: Expert 1

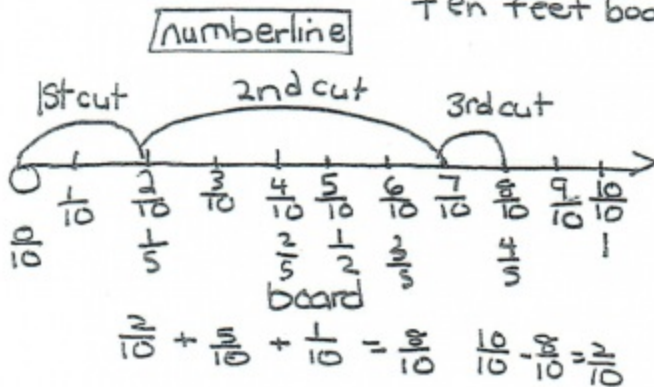
P/S	R/P	Com	Con	Rep	A/Level
E	E	E	E	E	E

I have to find out if Gavin is correct.
I will make an area model



$\frac{2}{10}$ is left
answer

Gavin is correct



table

Cut	board cut	total board cut
1	$\frac{2}{10}$	$\frac{2}{10}$
2	$\frac{5}{10}$	$\frac{7}{10}$
3	$\frac{1}{10}$	$\frac{8}{10}$

$\frac{10}{10} - \frac{8}{10} = \frac{2}{10}$ board left

I solved my problem 3 ways. I get $\frac{2}{10}$ left all the time so Gavin is correct.

Exemplars

Connections

Gravin uses more board than he keeps

$$12'' \times 10' = 120''$$

$12'' + 12'' = 24''$ he did not use
That is 2 dozen inches - $24''$

I see equivalent fractions

$$\frac{2}{10} \text{ of board} = \frac{1}{5}$$

$\frac{5}{10}$ of board is $\frac{1}{2}$ or 50% of the board.

$$\frac{4}{10} \text{ of board} = \frac{2}{5}$$

$\frac{10}{10}$ of board is 100% of board.

$$\frac{6}{10} \text{ of board is } \frac{3}{5}$$

That is percent like at the store
when a toy is 50% off.

$$\frac{8}{10} \text{ of board is } \frac{4}{5}$$

$\frac{10}{10}$ of board is 1 whole board

I put these fractions on my number line to show them.

$$\begin{array}{r} 60 \\ 2 \overline{) 120} \\ \underline{-120} \\ 0 \end{array} \quad \begin{array}{l} 60 \\ \hline 60 \end{array}$$

$\frac{1}{2}$ of Gavin's board is $5'$

$$12'' \times 5 =$$

$$10 \times 5 = 50$$

$$2 \times 5 = 10$$

$$60''$$

I know $\frac{1}{10}$ is 0.1 in decimal talk.

$$\frac{2}{10} \text{ is } 0.2$$

$$\frac{8}{10} \text{ is } 0.8$$

$$\frac{3}{10} \text{ is } 0.3$$

$$\frac{9}{10} \text{ is } 0.9$$

$$\frac{4}{10} \text{ is } 0.4$$

$$\frac{10}{10} = \text{whole (board)} 1.0$$

$$\frac{5}{10} \text{ is } 0.5$$

$$\frac{6}{10} \text{ is } 0.6$$

$$\frac{7}{10} \text{ is } 0.7$$

Key

" inches

' Foot or feet